PARSONS TECHNICAL MEMORANDUM

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DATE: August 2011

TO: File

FROM:

SUBJECT: Floodplain evaluation for Pyramid/McCarran EIS

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1.0 Introduction

This Floodplain Impacts Technical Memorandum (Report) was prepared in support of the Pyramid Way and McCarran Boulevard project. The purpose of this report is to identify the locations where the project may affect a 100-year event floodplain and make preliminary recommendations for mitigation and further study.

1.1 Project Objective

The main objective for this Report is to ensure that there are no adverse impacts to the floodplain and to protect life and property. In addition, the Washoe County Regional Transportation Commission would promote sound floodplain management and develop mitigation actions that support regulatory agencies requirements. Floodplain regulatory agencies are discussed in Section 1.5 of this report.

1.2 Project Description and Alternatives

The proposed project is to improve the intersection of McCarran Boulevard with Pyramid Way. The preferred alternative provides additional lanes for the through movements on Pyramid Way and the turning movements at the intersection and provides revised access control intersection along Pyramid way. The project limits extend along McCarran Boulevard from Rock Boulevard to 4th Street, and along Pyramid Way from Tyler Way to approximately 800' north of the existing Queen Way intersection. A detailed description of the project and alternatives can found in the Design Alternatives Report. This floodplain study focuses on the Preferred Alternative.

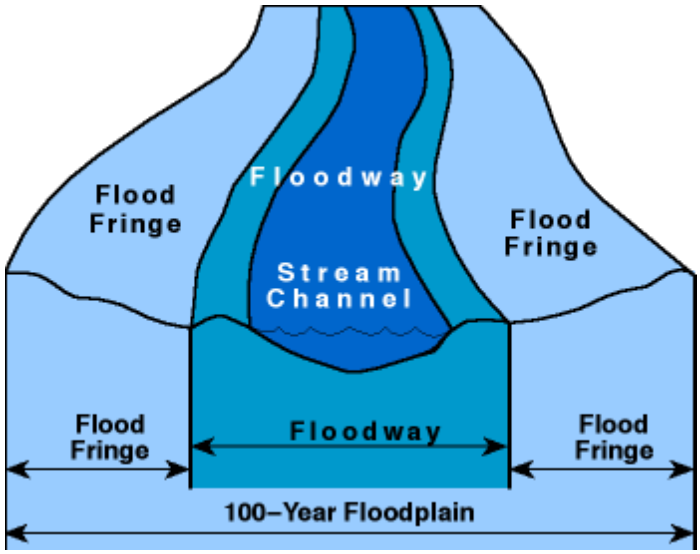
1.3 Definitions

1.3.1 Floodplain and Floodway

Floodplains are areas of land inundated by the river during the 100-year flood. Floodplains are a natural feature of rivers that may also occur in portions of a watershed on land depressions or wetlands. They are the mostly flat land adjacent to the river and are formed due to the actions of a river. Designated Floodway refers to the channel of the stream and that portion of the adjoining floodplain reasonably required to provide for the passage of a design flood. Developments are prohibited in the floodway. Figure 1-2 depicts both floodplain and floodway areas.

Rivers erode their own banks and redeposit the eroded material downstream. Material is added to the floodplain during floods, a process called overbank deposition. Rivers are constantly trying to reach an equilibrium state where there is balance of water and soil material. The material that underlies floodplains is a mixture of thick layers of sand and thin layers of mud. Undisturbed floodplains provide natural buffer by: (a) reducing the number and severity of floods, (b) minimizing nonpoint source water pollution, (c) filtering stormwater, (d) providing habitat for plants and animals, and (e) creating aesthetic beauty and outdoor recreation benefits.

When the flow in the river overtops its banks, the overflow spreads over the floodplain, which slows the flow of the water. Reduced water velocity can help prevent severe erosion and flooding downstream. In addition, during high water events, some of the water is absorbed by the floodplain, reducing the extent of the flooding. The absorbed water can then be returned to the stream during times of low water.



Typical Floodplain and Floodway Location with Respect to the Main Stream

Figure 1-2

Floodplains are also home to many types of plants and animals and may have forests and wetlands on or adjacent to them. These river edges provide habitat for insects, birds, reptiles, amphibians, and mammals. The vegetation also helps filter contaminants out of the water flowing into the river. Additionally, vegetated floodplains provide shade for the adjacent rivers and streams, increasing dissolved oxygen levels and consequently improving habitat for aquatic plants and animals.

1.3.2 Federal Emergency Management Agency Designations

The Federal Emergency Management Agency (FEMA) designates Special Flood Hazard Areas (SFHAs) according to Zones. The Base Flood Elevation (BFE) is the water-surface elevation of the 1% annual chance of flood. The zones are described as:

Zone A – Corresponds to the 100-year floodplains that are determined in the Flood Insurance Study (FIS) by approximate methods. No BFEs or depths have been determined.

Zone AE – Corresponds to the areas of 100-year floodplains that are determined in the FIS by detailed methods. In most instances, BFEs have been derived from detailed hydraulic analyses and are shown in this zone.

Zone AH – Corresponds to the areas of 100-year shallow flooding with a constant water-surface elevation. Flood depths of 1-foot (0.3-meter) to 3 feet (0.9-meter) (usually areas of ponding); BFEs are derived from detailed hydraulic analyses and are shown at selected intervals in this zone.

Zone AO – Corresponds to the areas of 100-year shallow flooding. Flood depths of 1-foot (0.3-meter) to 3 feet (0.9-meter) (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

Zone AR – Depicts areas protected from flood hazards by flood control structures such as levees that are being restored.

Zone X (dotted) – Other flood areas. Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1–foot (0.3-meter) or with drainage areas less than 1 square mile (2.5 square kilometers); and areas protected by levees from 1% annual chance flood.

Zone X – Areas determined to be outside the 0.2% annual chance floodplain.

Flood hazard areas in the study corridor are shown in Appendix A.

1.4 Federal Regulations

1.4.1 National Flood Insurance Program

FEMA developed the National Flood Insurance Program (NFIP) to assist thousand of communities across the country with floodplain management. NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these participating communities. In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the nation's floodplains. Mapping flood hazards creates broad-based awareness of the flood hazards and provides the data needed for floodplain management programs and to actuarially rate new construction for flood insurance.

Executive Order (EO) 11988 directs all federal agencies to avoid to the extent practicable and feasible all short-term and long-term adverse impacts associated with floodplain modification and to avoid direct and indirect support of development in 100-year floodplains whenever there is a reasonable alternative available. Projects that encroach upon 100-year floodplains must be supported with additional specific information. The U.S. Department of Transportation Order 5650.2, Floodplain Management and Protection, prescribes “policies and procedures for ensuring that proper consideration is given to the avoidance and mitigation of adverse floodplain impacts in agency actions, planning programs, and budget requests.” The order does not apply to areas with Zone C (areas of minimal flooding as shown on FEMA Flood Insurance Rate Maps [FIRM]).

1.4.2 U.S. Environmental Protection Agency

Under the Clean Water Act (CWA), the United States Environmental Protection Agency (EPA) was granted authority to implement pollution control programs, such as setting wastewater standards for industry. The CWA established the basic structure for regulating discharges of pollutants into the waters of the United States; in addition, it contains requirements to set water quality standards for all contaminants in surface waters. The CWA created the National Pollution Discharge Elimination System (NPDES) permit program to regulate the discharge of any pollutant from a point source into navigable waters by requiring those point sources to obtain a permit if their discharges go directly to surface waters.

1.4.3 Federal Emergency Management Agency

A Floodplain Evaluation is required as described under the NFIP (23 *Code of Federal Regulations* [CFR] 650, Subpart A Section 650). Section 650.111 of the regulations calls for location hydraulic studies to be performed with detailed engineering design drawings. Hydraulic modeling would be required, along with a hydraulic report summarizing the results (to be submitted for review by the local agencies listed in the FIRMs). A Conditional Letter of Map Revision (CLOMR) and a Letter of Map Revision (LOMR) may be required by FEMA for work in a floodway or for work resulting in significant impacts to the 100-year floodplain.

1.4.4 Clean Water Act (33 U.S.C. § 1251 et seq.)

The purpose of the CWA is restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters through prevention and elimination of pollution. The CWA applies to discharges of pollutants into waters of the United States. The Nevada Division of Environmental Protection (NDEP) is the State agency with primary responsibility for implementation of state and federally established regulations relating to hydrology and water quality issues.

The CWA operates on the principle that any discharge of pollutants into the nation's waters is prohibited unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool. The following CWA sections are most relevant to this analysis of the floodplain impacts of the project.

1.5 Required Permits and Approvals

1.5.1 U. S. Army Corp of Engineers 404 Permit

This permit is required if the project impacts the waters of the United States, including wetlands, under the Federal Clean Water Act (Section 404). Section 404 of the CWA enables the Army Corps of Engineers (Corps) to grant permits activities within waterways and wetlands. Construction projects affecting wetlands in any state cannot proceed until a §404 permit has been issued.

If a 404 permit is required, this project may fall under the nationwide permit for linear transportation project. Nationwide Permit 14 limits activities to construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project.

1.5.2 Section 401 Water Quality Certification: Certification by the State of Nevada Bureau of Water Quality Planning to the United States Army Corps of Engineers and U.S. Fish and Wildlife Service

By Federal law, every applicant for a Federal permit or license for an activity, which may result in a discharge into a water body, must request State certification that the proposed activity will not violate State and Federal water quality standards. The Nevada Division of Environmental Protection's (NDEP) Bureau of Water Quality Planning (BWQP) is responsible for issuing or denying 401 Water Quality Certification (WQC) for Nationwide Permits. The project's discharge must comply with all applicable State and Federal laws, policies and regulations governing the protection of the beneficial uses of the State's Waters.

1.5.3 National Pollutant Discharge Elimination System Permit

Based upon this authority, the Bureau of Water Pollution Control (BWPC) under NDEP is the state agency that issues surface water discharge permits (NV Permits or NPDES Permits). NPDES Permits regulate discharges to "waters of the United States" including lakes, streams and dry washes. The NPDES Program also issue permits for Municipal Separate Storm Sewer Systems (MS4s) that authorize discharges of stormwater. All NPDES Permits are sent to EPA - Region IX for review and approval before they are issued to the Nevada Permittee.

2.0 Major Floodplain/Rivers/Wetlands

The project area falls within the North Truckee Drain sub-basin and the Truckee River watershed as shown in Figure 2-1. Truckee River is approximately 2.75 miles south of the project area. This project will have an indirect impact to the river; however, consideration must be given as a tributary to this major river and minimize its degradation.

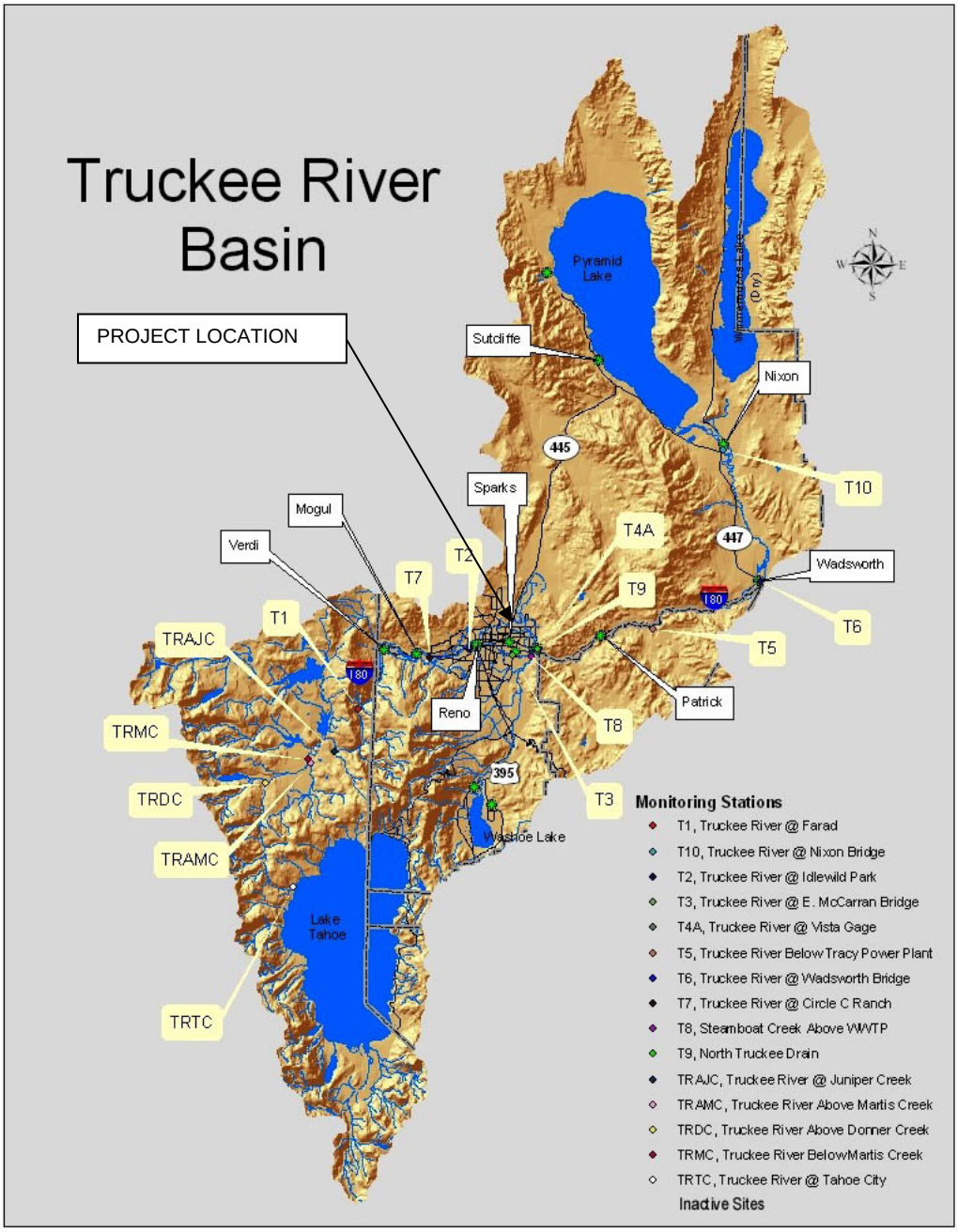
There are no major rivers or wetlands adjacent to the project area. The nearest major drainages are Sun Valley Wash to the northeast and the North Truckee Drain to the east. The detention basin outlet pipe for Sun Valley Wash ultimately drains to a storm drain under McCarran Boulevard. The storm drain conveys flows from the surrounding area to the North Truckee Drain.

2.1 Truckee River

The Truckee River's source is the outlet of Lake Tahoe, at the dam on the northwest side of the lake near Tahoe City, California. It flows generally northwest through the mountains to Truckee, California, then turns sharply to the east and flows into Nevada, through Reno and Sparks and along the northern end of the Carson Range. At Fernley it turns north, flowing along the east side of the Pah Rah Range. It empties into the southern end of Pyramid Lake, a remnant of prehistoric Lake Lahontan, in northern Washoe County in the Pyramid Lake Indian Reservation.

2.1.1 Local Agencies

To address the flood protection needs of the citizens, the cities of Reno and Sparks and Washoe County has formed the Truckee River Flood Management Project. The Truckee River Flood Management Project's goal is to reduce the impact of flooding in the Truckee Meadows, restore the Truckee River ecosystem, and improve recreational opportunities by managing the development and implementation of the Truckee River Flood Management Project.



Truckee River Basin

Figure 2-1

3.0 Initial Floodplain Impacts and Recommended Mitigation

According to FEMA FIRM Map Nos. 32031C3045G, 32031C3034G, 32031C3053G and 32031C3061G, the project lies within Zone X Flood Hazard Area. Zone X are the flood insurance rate zones that correspond to areas outside the 100-year floodplain or areas of 100-year sheet flow flooding where average depths are less than 1 foot.

During final design, a professional engineer with floodplain expertise shall prepare a hydrologic and hydraulic evaluation of project and off-site areas. The analysis shall compare the existing and post-project 100-year flow rates to ensure that the project does not increase downstream flows and time of concentration. In addition, the analysis shall also ensure that the project does not adversely impact surrounding properties by diverting or increasing flows towards the properties. Additional right of way for detention basins to attenuate flows may be necessary to mitigate the additional flows generated by increased impervious areas. Since the area is not subject to a 100-year flood inundation, minimal floodplain mitigation is expected. FEMA maps area shown in the Appendix A.

The Orr Ditch, which runs west to east, crosses McCarran Boulevard just east of Sullivan Lane, and then runs around the Wildcreek Golf Course before crossing the project site north of the Queen Way intersection via a 12-foot by 4-foot RCB. The Orr Ditch runs only at specific seasons of the year and conveys irrigation water from the Truckee River. The Orr Ditch would be extended with the widening of Pyramid Way and the improvements would disturb 0.05 acre. The Orr Ditch is under the jurisdiction of the USACE and is subject to the terms and conditions of a Section 404 permit if permanent impacts exceed 0.10 acre.

4.0 Other Considerations

4.1 Beneficial Floodplain Values

There are many beneficial uses for the Truckee River floodplain. There are several direct and indirect impacts to the beneficial values due to the proposed improvements. The Nevada Division of Environmental Protection and the Bureau of Water Quality Planning designate beneficial uses for the Truckee River Basin. The beneficial uses that have been identified are as follows:

- Irrigation – Water suitable for irrigation without treatment.
- Watering of livestock – Water suitable for the watering of livestock without treatment.
- Body Contact Recreation – Recreational activities involving body contact with water.
- Nonbody Contact Recreation – Recreational activities involving proximity to water but generally no body contact or ingestion of water.
- Industrial Supply - The water must be treatable to provide a quality of water, which is suitable for the intended use.
- Municipal and Domestic Supply – The water must be capable of being treated by conventional methods of water treatment in order to comply with Nevada's drinking water standards.
- Wildlife Habitat – Water suitable for the propagation of wildlife and waterfowl without treatment.
- Aquatic - Water suitable as a habitat for fish and other aquatic life existing in a body of water. This does not preclude the reestablishment of other fish or aquatic life.

4.2 Climate Change

4.2.1 Background

There is rising concern about climate change. Increasing air and water temperatures, altered hydrology and/or rainfall patterns may affect our region and its water resources, resulting in more severe droughts or floods or both.

4.2.2 Climate Change and Greenhouse Gas Emission –Federal Laws

Climate change and greenhouse gas reduction is also a concern at the federal level; however, at this time, no federal legislation or regulations have been enacted specifically addressing greenhouse gas emissions reductions and climate change.

5.0 Recommendations

5.1 Measures to Minimize Impacts to Floodplains

The following measures will be incorporated into the design and construction phases to minimize potential floodplain impacts:

- To ensure no adverse impact on the floodplain limits and base flood elevations, perform hydrology and hydraulic studies to compare pre- and post-project condition water surface elevation and velocity as indicated in the FEMA guidelines shown below.
- Flood events having a 1% annual chance (100-year flows) shall studied in detail.
- Adequate conveyance capacity will be provided at bridge crossings to ensure no net increase in velocity.
- Provide positive drainage during construction and refrain from diverting flows.

5.2 Federal Emergency Management Agency Guidelines for Special Flood Hazard Area Mitigations

- Zone A – Any encroachment that exceeds 5 acres (2 hectares) or 50 lots will require that a BFE be developed for that area. The engineering analysis will have to show pre- and post-project conditions and be forwarded to FEMA for their review and approval. Once approved, all fill or tracks placed in the SFHAs will have to be built to or above the BFE determined.
- Zone AE – Any encroachment in or adjacent to a riverine/stream or creek system will require an analysis that shows the pre- and post-project cumulative effects, which are not to exceed more than 1-foot (0.3-meter) of surcharge.
- Zone AE/Floodway – Where a riverine/stream or creek is defined that contains a floodway, an engineering analysis will have to be conducted that shows the pre- and post-project conditions and that a no-rise in the BFE will occur. The analysis will have to be forwarded to FEMA for their review and approval prior to any development taking place.
- Where an SFHA is defined and a crossing or bridge is placed, an engineering analysis will have to be conducted that shows the pre- and post-project conditions and that a no-rise in the BFE will occur, if a floodway exists. The analysis will have to be forwarded to FEMA for their review and approval prior to any development taking place.
- All analyses, prior to being submitted, will require communities approval and signature prior to submittal, as well.

5.3 Water Quality Measures

- Employ recommended water quality measures.
- In-river construction and post-construction will include erosion control and water quality protection.
- A contingency plan will be developed for unforeseen discovery of underground contaminants.

- Comply with the NDEP/BWPC discharge permits requirements. These permits define the quality of the discharge necessary to protect the quality of the waters of the State.

6.0 References

1. Design Alternatives Report, Pyramid Way and McCarran Boulevard Intersection Improvement Project,

2. Flood insurance Rate Maps, Various, by the Federal Emergency Management Agency

3. Nevada Division of Environmental Protection website: *http://ndep.nv.gov/*

4. US Army Corp of Engineers website: *http://www.spn.usace.army.mil/*

5. A report on Sea Level Rise Preparedness, California State Lands Commission, December 2009.

APPENDIX A
Floodplain Location Maps

tional Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METER

Washoe County
Unincorporated Areas
320019

2285000 FT 2290000 FT JOINS PANEL 3034 2295000 FT 119°45'00" 39°33'45"

ZONE X

CITY OF SPARKS
WASHOE COUNTY

KR1301

MCCARRAN BLVD

31 32 33

KR1342

PROJECT LIMIT

City of Sparks
320021

43 82 000m N

KR1344

KR1346

KR1339

KR1341

PROJECT LIMIT

PYRAMID WAY

T. 20 N.
T. 19 N.

R. 19 E. R. 20 E.

395

City of Reno
320019

CITY OF RENO
CITY OF SPARKS

KR1334

JOINS PANEL 3061

43 81 000m N

ODDIE BOULEVARD

ZONE X

KR1338

KR1337

5 6 4

KR1336

City of

NFIP

PANEL 3045G

FIRM

FLOOD INSURANCE RATE MAP

WASHOE COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 3045 OF 3475
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RENO, CITY OF	320020	3045	G
SPARKS, CITY OF	320021	3045	G
WASHOE COUNTY	320019	3045	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

NATIONAL FLOOD INSURANCE PROGRAM

MAP NUMBER
32031C3045G

MAP REVISED
MARCH 16, 2009

Federal Emergency Management Agency

Washoe County
Unincorporated Areas
320019

29

28

CITY OF SPARKS

WASHOE COUNTY

32

33

JOINS PANEL 3045

$^{43}84^{000m}$N

$^{43}83^{000m}$N

$^{2}63^{000m}$E

39°33'45"

119°45'00"

City of
Sparks
320021

MAP SCALE 1" = 500'

250 0 500 1000

FEET

METER

PANEL 3034G

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

WASHOE COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 3034 OF 3475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RENO, CITY OF	320020	3034	G
SPARKS, CITY OF	320021	3034	G
WASHOE COUNTY	320019	3034	G

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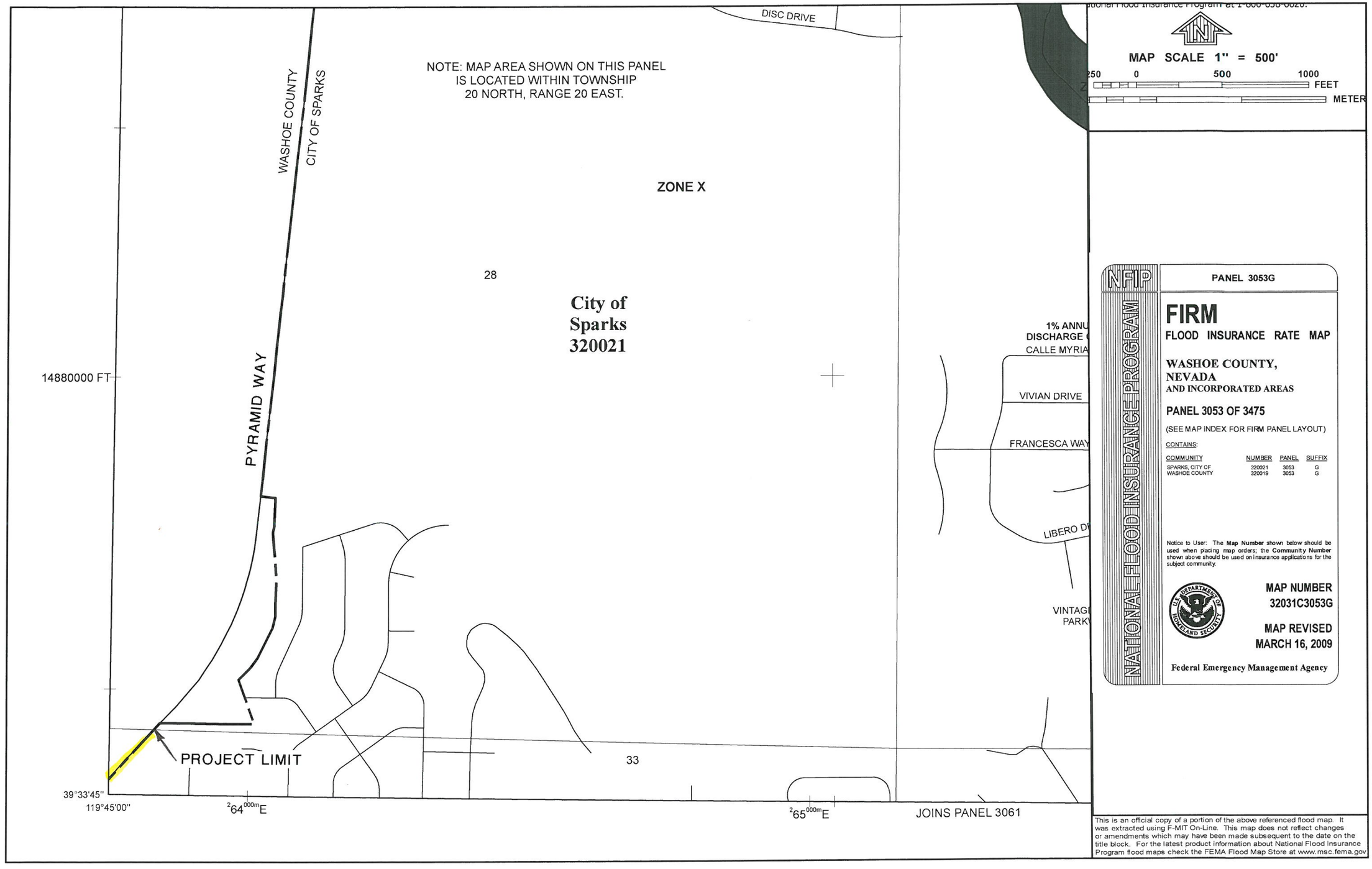
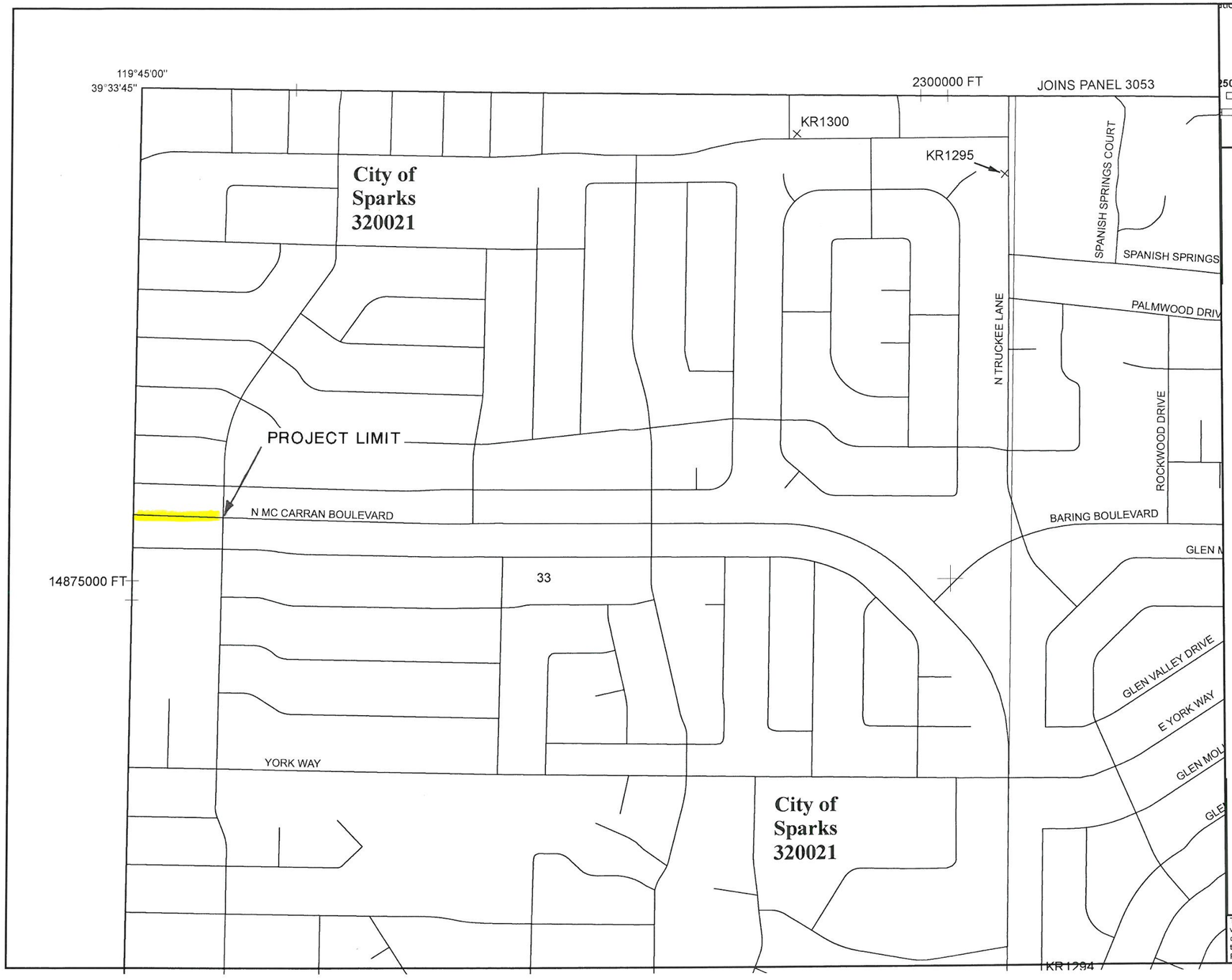
MAP NUMBER
32031C3034G

MAP REVISED
MARCH 16, 2009

Federal Emergency Management Agency


DISC DRIVE
NOTE: MAP AREA SHOWN ON THIS PANEL
IS LOCATED WITHIN TOWNSHIP
20 NORTH, RANGE 20 EAST.
WASHOE COUNTY
CITY OF SPARKS
ZONE X
28
City of
Sparks
320021
14880000 FT
PYRAMID WAY
1% ANNU
DISCHARGE
CALLE MYRIA
VIVIAN DRIVE
FRANCESCA WAY
LIBERO DR
VINTAG
PARK
PROJECT LIMIT
33
39°33'45"
119°45'00"
264 000m E
265 000m E
JOINS PANEL 3061
tional Flood Insurance Program at 1-800-638-6620.
MAP SCALE 1" = 500'
250 0 500 1000
FEET
METER
PANEL 3053G
FIRM
FLOOD INSURANCE RATE MAP
WASHOE COUNTY,
NEVADA
AND INCORPORATED AREAS
PANEL 3053 OF 3475
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
SPARKS, CITY OF 320021 3053 G
WASHOE COUNTY 320019 3053 G
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
32031C3053G
MAP REVISED
MARCH 16, 2009
Federal Emergency Management Agency
NATIONAL FLOOD INSURANCE PROGRAM
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000

FEET

METER

NFIP

PANEL 3061G

FIRM

FLOOD INSURANCE RATE MAP

WASHOE COUNTY, NEVADA
AND INCORPORATED AREAS

PANEL 3061 OF 3475

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SPARKS, CITY OF	320021	3061	G

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MAP NUMBER
32031C3061G

MAP REVISED
MARCH 16, 2009

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

APPENDIX B
List of FEMA FIRM Maps

1. 32031C3034G – Washoe County
2. 32031C3045G – Washoe County
3. 32031C3053G – Washoe County
4. 32031C3061G – Washoe County